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PRE-ACCRETIONARY, ON-LAND, TECTONIC ENVIRONMENTS

Submarine terranes are labeled, but not coloured)

Craton margin

Cratonal terranes

Middle Tertiary

Early Tertiary and Late Cretaceous

Early Cretaceous and Late Jurassic

Geological Survey of Canada Open File 3428

This summary tectonostratigraphic map depicts on-land and offshore geologic/tectonic units in the circum-North Pacific region. The map is a summary of a more detailed presentation of the onshore and offshore geology of the region at a scale of 1:5,000,000 (Nokleberg and others, 1994b). This more detailed map also contains descriptions of terranes, overlap assemblages, and other major geologic units, an extensive bibliography of cited references, and 188 stratigraphic columns of terranes, cratons, and craton margins. This summary map is one of a series of reports and maps on the mineral deposits, metallogenesis, and geology of the Circum-North Pacific. Additional detailed information on mineral deposits and interpretation of metallogenic belts for the region is available in U.S.G.S. Open-File Report 93-339 on the metallogenesis of mainland Alaska and the Russian Northeast (Nokleberg and others, 1993). This summary map and the more detailed map are the result of extensive geologic

napping and associated tectonic studies in the Russian Far East, Hokkaido Island of Japan, Alaska, the Canadian Cordillera, and the U.S.A. Pacific Northwest in the last few decades. Geologic mapping suggests that most of this region can be interpreted as a collage of faultbounded tectonostratigraphic terranes that were accreted onto continental margins around the Circum-North Pacific mainly during the Mesozoic and Cenozoic (Parfenov, 1984, 1991 Howell and others, 1985; Watson and Fujita, 1985; Parfenov and Natal'in, 1985, 1986; Jones and others, 1987; Monger and Berg, 1987, Fujita and Cook, 1990; Zonenshain and others, 1990; Natal'in, 1991, 1993; Moore and others, 1994; Silberling and others, 1992; Nokleberg and others, 1994a-c; Plafker and Berg, 1994; Tabor, 1994). A key definition for the map is tectonostratigraphic terrane which is defined below as a fault-bounded geologic entity or fragment that is characterized by a distinctive geologic history that differs markedly from that of adjacent terranes (Jones and others, 1983; Howell and others, 1985). Most tectonostratigraphic terranes (hereafter referred to as terrane) are fault- bounded, stratigraphically coherent assemblages that formed before accretion, i.e. tectonic juxtaposition, to adjacent units. A few terranes are fault-bounded structural complexes, mainly subduction zone or accretionary-wedge complexes. The terranes are bounded by various types of major faults or fault zones named sutures. Paleontologic, stratigraphic, and paleomagnetic evidence suggests that some terranes were originally widely separated from one another, or from the cratons of either North America or North Asia by distances of as much as thousands of kilometers (Plafker and Berg, 1994). Other terranes are interpreted to be displaced from one another or from another position on the same continent by distances of only hundreds of kilometres or less. On this map the terranes are interpreted according to their inferred tectonic environments These environments are (1) cratonal; (2) passive continental margin; (3) metamorphosed continental margin; (4) continental-margin arc; (5) island arc; (6) oceanic crust, seamount, and ophiolite; (7) accretionary wedge and subduction zone; (8) turbidite basin; and (9) metamorphic terrane for terranes that are too highly deformed and metamorphosed to

the chosen color indicates the tectonic environment most prevalent during this history of the terrane. The tectonic environments inferred for igneous rocks are temporal (pre- and post-accretion) and genetic (subduction-related, rift-related, and collisional related In addition to terranes, the map also depicts postaccretion units that include: (1) Cenozoic and Mesozoic overlap assemblages of sedimentary and volcanic rocks that were deposited across two or more terranes; (2) Cenozoic and Mesozoic basinal deposits that occur within a terrane or on the craton; (3) plutonic rocks. For simplicity, post-accretionary sedimentary, volcanic, and plutonic rocks are combined into individual postaccretion units. These overlap assemblages and basinal deposits formed mainly during sedimentation and magmatism that occurred after accretion of terranes to each other or to a continental margin. Overlap assemblages provide minimum ages on the time of accretion of terranes. Some Cenozoic and Mesozoic overlap assemblages and basinal deposits, as well as fragments of terranes, are extensively offset by movement along postaccretion faults.

determine the original tectonic environment. For terranes with complex geologic histories,

Significant differences exist between the representation of onshore and offshore geology. These are: (1) the offshore part of the map is depicted in a more schematic fashion than the onshore part because of more limited data and because the offshore terranes and early Cenozoic and older overlap assemblages generally are obscured by extensive late Cenozoic sedimentary cover that is not shown unless thicker than two kilometres; (2) marginal contacts of offshore Cenozoic and Cretaceous sedimentary basins do not match contacts of onshore Cenozoic and Cretaceous sedimentary units because offshore basins are limited to those Grantz, Arthur, Moore, T.E., and Roeske, S.M. regions with sediment thicknesses greater than two kilometres; and (3) for simplicity, the major onshore Cenozoic sedimentary basins are generally not defined and described separately because the onshore part of the map is designed to emphasize terranes and overlap volcanic assemblages that are crucial for both for tectonic and metallogenic analyses published elsewhere (Nokleberg and others, 1994a-c).

Several key geologic sources were used in the compilation of the map. For Alaska, the basic outcrop pattern for the map is from Beikman (1980). Gehrels and Berg (1992, 1994). Barker and others (1994), Brew (1994), and Moll-Stalcup and others (1994). The distribution of terranes is from Jones and others (1987), Monger and Berg (1987), and Brew (1994), with modifications by Grantz and others (1991), Worall (1991), Nokleberg and others (1994a-c), the cited references, and the Alaskan co-authors of this report. For the Canadian Cordillera, the basic outcrop pattern is from Monger and Berg (1987). Wheeler and others (1988), and Wheeler and McFeeley (1991) with modifications by the Canadian authors. For the northern part of the Russian Far East, the basic outcrop pattern is from Sosunov (1985) with modifications by the Russian authors. For the southern part of the Russian Far East, the basic outcrop pattern is from Krasny (1991) and Bazhanov and Oleinik (1986) with modifications by the Russian authors. For the offshore areas of the central and eastern north Pacific Ocean, the basic pattern is from Atwater (1989) and Atwater and Severinghaus

TECTONIC DEFINITIONS The following definitions are modified from Coney and others (1980), Jones and others 1983), Howell and others (1985), Monger and Berg (1987), Wheeler and others (1988), and

Wheeler and McFeeley (1991), with modifications by the authors. Accretion. Tectonic juxtaposition of two or more terranes, or tectonic juxtaposition of terranes to a continental margin. Accretionary wedge and subduction zone terrane. Fragment of a mildly to intensely deformed complex consisting of varying amounts of turbidite deposits, continental margin rocks, oceanic crust and overlying units, and oceanic mantle. Divided into units composed predominantly of turbidite deposits or predominantly of oceanic rocks. Units are interpreted to have formed during tectonic juxtaposition in a zone of major thrusting of one lithospheric plate beneath another, generally in zones of thrusting along the margin of a continental or an island arc. May include large fault-bounded units with a coherent stratigraphy. Many subduction zone terranes contain fragments of oceanic crust and associated rocks that exhibit a complex structural history, occur in a major thrust zone, and possess blueschist facies metamorphism. Basinal deposits. An assemblage of sedimentary and lesser amounts of volcaniclastic and volcanic rocks that were deposited on a single terrane after accretion, or onto a craton margin or craton after a major orogenic event. Includes some foreland and successor basin deposits, and forearc, intra-arc, and backarc deposits. Collage of terranes. Groups of tectonostratigraphic terranes, generally in oceanic areas, for which insufficient data exist to separate units. Craton. Chiefly regionally metamorphosed and deformed shield assemblages of Archean and Early Proterozoic sedimentary, volcanic, and plutonic rocks, and overlying platform successions of Late Proterozoic, Paleozoic, and local Mesozoic and Cenozoic sedimentary

Craton margin. Chiefly Late Proterozoic through Jurassic sedimentary rocks deposited on a continental shelf or slope. Consists mainly of platform successions. Locally has, or may have had an Archean and Early Proterozoic cratonal basement. Cratonal terrane. Fragment of a craton.

Continental margin arc terrane. Fragment of an igneous belt of coeval plutonic and volcanic rocks and associated sedimentary rocks that formed above a subduction zone dipping beneath a continent. Foreland basin. Trough or depression filled with clastic deposits that was deposited adjacent to an orogenic belt. Island arc terrane. Fragment of an igneous belt of plutonic rocks, coeval volcanic rocks, and associated sedimentary rocks that formed above an oceanic subduction zone. Metamorphic terrane. Fragment of a highly metamorphosed or deformed assemblage of sedimentary, volcanic, or plutonic rocks that cannot be assigned to a single tectonic environment because the original stratigraphy and structure are obscured. Includes intensely-deformed structural melanges that contain intensely-deformed fragments of two or more terranes.

places moderately to highly metamorphosed and deformed, that cannot be linked with certainty to the nearby craton margin. May be derived either from a nearby craton margin or from a distant site. Oceanic crust, seamount, and ophiolite terrane. Fragment of part or all of a suite of deep-marine sedimentary rocks, pillow basalt, gabbro, and ultramafic rocks that are interpreted as oceanic sedimentary and volcanic rocks and the upper mantle. Includes both inferred offshore oceanic and marginal ocean basin rocks, minor volcaniclastic rocks of magmatic arc derivation, and major marine volcanic accumulations formed at a hotspot,

Metamorphosed continental margin terrane. Fragment of a passive continental margin, in

fracture zone, or spreading axis. Overlap assemblage. A post-accretion unit of sedimentary or igneous rocks deposited on, or intruded into, two or more adjacent terranes. The sedimentary and volcanic parts either depositionally overlie, or are interpreted to have originally depositionally overlain, two or more adjacent terranes, or terranes and the craton margin. Overlapping plutonic rocks, which may be coeval and genetically related to overlap volcanic rocks, link or stitch together adjacent terranes, or a terrane and a craton margin. Passive continental margin terrane. Fragment of a craton margin.

Post-accretion rock unit. Suite of sedimentary, volcanic, or plutonic rocks that formed in the late history of a terrane, after accretion. May occur also on adjacent terranes or on the craton margin either as an overlap assemblage or as a basinal deposit. A relative-time term denoting rocks formed after tectonic juxtaposition of one terrane to an adjacent terrane. Pre-accretion rock unit. Suite of sedimentary, volcanic, or plutonic rocks that formed in the early history of a terrane, before accretion. Constitutes the stratigraphy and igneous geology nherent to a terrane. A relative-time term denoting rocks formed before tectonic juxtaposition of one terrane to an adjacent terrane. Seamount and oceanic plateau. Major marine volcanic accumulations generally formed at a hotspot, fracture zone, or spreading axis. Subterrane. Fault-bounded unit within a terrane that exhibits a similar but not identical geologic history relative to another fault bounded unit in the same terrane. Superterrane. An aggregate of terranes that is interpreted to share either a similar stratigraphic kindred or affinity, or a common geologic history after accretion. A synonym is composite terrane . Terrane. A fault-bounded geologic entity or fragment that is characterized by a distinctive geologic history that differs markedly from that of adjacent terranes. Constitutes a physical entity, i.e. a stratigraphic succession bounded by faults, inferred faults, or an intensely-deformed structural complex bounded by faults. Some terranes may be displaced facies of other terranes.

scale 1:2,000,000. Turbidite basin terrane. Fragment of a basin filled with deep-marine clastic deposits in either Woodsworth, G.J. an orogenic forearc or backarc setting. May include continental-slope and continental-rise turbidite deposits, and submarine-fan turbidite deposits deposited on oceanic crust. May include minor epiclastic and volcaniclastic deposits.

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Passive continental margin terranes Metamorphosed continental margin terranes SYMBOLS Continental margin arc terranes Contact (depositional or intrusive contact that is not a terrane boundary. ncludes marginal contacts of overlap sedimentary and volcanic assemblages, basinal deposits, and plutons) Island arc terranes Oceanic crust, sea mount, ophiolite, and convergent margin terranes displacement unknown) Oceanic crust, sea mount, and ophiolite terranes of unknown mode Postaccretion thrust fault (sawteeth point toward upper plate) Postaccretion strike-slip fault (arrows denote relative Accretionary wedge and subduction zone terranes--A. Predominantly strike-slip displacement) turbidites with lesser or no oceanic rocks Postaccretion normal or extension fault (barb indicates downdropped Accretionary wedge and subduction zone terranes--B. Predominantly ceanic rocks with generally lesser amounts of turbidites block; locally superposed on older thrust fault) • • • • Fault bounding terrane or oceanic plate (dotted where concealed beneath overlap assemblages or basinal deposits. Sense and age of Turbidite basin terranes Thrust or reverse fault bounding terrane or oceanic plate (dotted where concealed. Sawteeth point toward upper plate) Metamorphic terranes Strike-slip fault bounding terrane or oceanic plate (dotted where POST-ACCRETIONARY, ON-LAND, CENOZOIC AND MESOZOIC concealed. Arrows denote relative displacement) SEDIMENTARY AND IGNEOUS OVERLAP ASSEMBLAGES Active or extinct oceanic spreading ridge (dotted where approximately (For overlap assemblages with a long age span, the colour of the youngest major unit is shown) located or concealed beneath younger deposits) Quaternary and late Tertiary ---- Selected ocean floor magnetic lineation (number shows correlation with geomagnetic polarity time scale) Cenozoic (Quaternary and Tertiary)

Minor offshore Mesozoic or Cenozoic basin (thickness greater than about

Abbreviation (in parentheses) for named assemblage of sedimentary or

where space permits

volcanic rocks; used in combination with age and lithologic symbol

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**LE** Lena thrust belt (Russian Northeast LS Lyakhov-South Anyui fault (Russian Northeast) Large seamount or oceanic plateau MO Mongol-Okhotsk strike-slip fault (Russian Southeast) MT Myatis thrust fault (Russian Northeast) Small seamount NF Nixon Fork dextral-slip fault (Alaska) NR Northern Rocky Mountain Trench dextral-slip fault (Canadian Cordillera) PI Pinchi dextral-slip fault (Canadian Cordillera) PK Paukan fault (Russian Southeast) PO Porcupine fault (Alaska) Combined abbreviation for terrane (AN) and stratigraphically overlying ST South Tukuringra thrust fault (Russian Southeast) overlap assemblage or basinal deposits (Czs) TE Teslin dextral-slip fault (U.S.A. Pacific Northwest)

ABBREVIATIONS FOR MAJOR FAULTS

BR Border Ranges thrust fault system (Alaska and Canadian Cordillera)

CS Chatham Strait dextral-slip fault (Alaska and Canadian Cordillera)

FS Fraser-Straight Creek dextral-slip fault (Canadian Cordillera)

LA Lower Aldan thrust fault and strike-slip zone (Russian Northeast)

77 Tintina dextral-slip fault (Alaska and Canadian Cordillera)

VT Vatyn thrust fault (Russian Northeast)

WA Waneta thrust fault (Canadian Cordillera)

YR Yarkhodon thrust fault (Russian Northeast)

WR Wrangell fault (East Siberian Sea)

DE Denali dextral-slip fault (Alaska) (Shakwak fault in Canadian Cordillera)

CA Central Sikhote-Alin strike-slip fault (Russian Southeast)

AD Adycha-Taryn thrust fault (Russian Northeast)

AS Arsenev strike-slip fault (Russian Southeast)

AN Anzhu fault (East Siberian Sea)

AM Amur fault (Russian Southeast)

CO Contact thrust fault (Alaska)

KA Kaltag dextral-slip fault (Alaska)

AR Arlis transform fault (East Siberian Sea)

BI Bilyakchan fault (Russian Northeast)

**DP** Darpir strike-slip fault (Russian Northeast)

KO Kobuk-South Fork strike-slip fault (Alaska)

**KY** Kvilakan thrust belt (Russian Northeast)

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nsb Novosibirsky sedimentary basin (Late Cretaceous to Quaternary) (East Siberian Sea) nsk North Sakhalin sedimentary basin (Cenozoic) (western Sea of Okhotsk) oc Okhotsk-Chukotka volcanic-plutonic belt (Cretaceous and Paleocene) (eastern Russian Northeast)

om Omineca-Selwyn plutonic belt (mid-Cretaceous) (eastern Canadian Cordillera, interior and northern oo Oregon-Olympic sedimentary forearc basin (Eocene to Miocene) (U.S.A. Pacific Northwest and ffshore of Vancouver Island, Canadian Cordillera) os Oshima sedimentary-volcanic basin (late Paleogene to Quaternary) (Hokkaido Island, Japan)

pn Penzhina sedimentary basin (mid- and Late Cretaceous) (central part of Russian Northeast) rc Rauhcha sedimentary basin (Late Jurassic to mid-Cretaceous) (northeastern part of Russian sb Spences Bridge volcanic-plutonic belt (mid-Cretaceous) (southern British Columbia, Canadian sf Sanak-Baranof plutonic belt (Late Cretaceous and early Tertiary) (coastal southern Alaska) sh Shirshov Ridge volcanic belt (early Tertiary?) (western Bering Sea)

ua Upper Amur sedimentary assemblage (Jurassic) (northwestern part of Russian Southeast)

sk Skeena sedimentary assemblage (Early Cretaceous) (northern British Columbia, Canadian sn Skonun sedimentary assemblage (Miocene and Pliocene) (east of Queen Charlotte Island, so South Okhotsk sedimentary basin (Cenozoic) (southern Sea of Okhotsk) sp Sakhalin-Primorye volcanic belt (late Tertiary and Quaternary) (Sea of Japan and adjacent areas)

Tinro sedimentary basin (Late Cretaceous and Cenozoic) (Sea of Okhotsk) to Torom sedimentary basin (Late Jurassic and Early Cretaceous) (northeastern part of Russian Tatar sedimentary basin (Cenozoic) (northern Sea of Japan) Tahtsa-Twin Sisters-Francois Lake magmatic assemblage (Middle Jurassic-Early Cretaceous) (central part of Canadian Cordillera)

ud Uda volcanic-plutonic belt (Late Jurassic and Early Cretaceous) (southern part of Russian uo Umlekan-Ogodzhin volcanic-plutonic belt (Jurassic and Cretaceous) (northeastern part of Russian vk Verkhoyansk collisional granite belt (Late Jurassic and Early Cretaceous) (southern and western wk West Kamchatka sedimentary basin (Tertiary) (western Kamchatka Peninsula and adjacent Sea of

wr Wrangell volcanic field (middle Tertiary to Holocene) (eastern-southern Alaska) ABBREVIATIONS FOR CRATON, CRATON MARGIN, OCEANIC PLATE, AND BACK-ARC-SPREADING UNITS

Craton and Craton-Margin Rock Units North American Craton and Craton Margin NAC Western North American Craton (Archean through Cenozoic) (east of Canadian Cordillera) NAM North American Craton Margin (Proterozoic, Paleozoic, and early Mesozoic) (between North American Craton and terranes of Canadian Cordillera) North Asian Craton and Craton Margin (eastern and southern parts of Siberia)

NSC North Asian Craton (Archean and Early Proterozoic) (eastern part of North Asian Craton) NSS North Asian Craton - Stanovoy block (Archean and Early Proterozoic) (southern part of North NSV North Asian Craton Margin (Verkhoyansk fold belt) (Paleozoic and early Mesozoic) (between North Asian craton and accreted terranes)

> NR Northwind Ridge terrane (passive continental margin) (late Early Cretaceous and Tertiary) (Beaufort Sea, Chukchi Sea, and adjacent area) NY Nyac terrane (island arc) (southwestern Alaska)

> > (Hokkaido Island, Japan) PA Penzhina-Anadyr terrane (accretionary wedge and subduction zone - dominantly oceanic rocks) (western part of Koryak Highlands, eastern Russian Northeast) PC Porcupine terrane (passive continental margin) (northeastern Alaska and northwestern Yukon

PW Prince William terrane (accretionary wedge or subduction zone - predominantly turbidites) (coastal Active Spreading Seafloor and Cenozoic Oceanic Plates QN Quesnellia terrane (island arc) (central part of Canadian Cordillera) Active Spreading Seafloor (Pacific Ocean) JA Juan de Fuca Plate (Cenozoic) (eastern Pacific Ocean) PAC Pacific Plate (Cenozoic) (Pacific Ocean)

North American Plate (East Siberian Sea) AMU Amundsen Basin (Cenozoic) (Beaufort Sea, Chukchi Sea, and adjacent area) KME Komandorsky Plate East (early Miocene) (Komandorsky Basin, western Bering Sea) KMW Komandorsky Plate West (early Miocene) (Komandorsky Basin, western Bering Sea)

SJ Sea of Japan back-arc unit (Cenozoic) (Sea of Japan) TECTONOSTRATIGRAPHIC TERRANES (Arranged alphabetically by map symbol; interpreted tectonic environment and region in parentheses ) AA Arctic Alaska superterrane (northern Alaska and western Seward Peninsula)

BA Baker terrane (accretionary wedge and subduction zone - predominantly oceanic rocks)

BD Badzhal terrane (accretionary wedge and subduction zone - predominantly oceanic rocks) (northern

CC Cache Creek terrane (accretionary wedge and subduction zone - predominantly oceanic rocks)

Back-Arc Spreading Units

AG Angayucham terrane (accretionary wedge and subduction zone - predominantly oceanic rocks) (east- and west-central Alaska, and southern Brooks Range) AK Avekova terrane (cratonal) (east-central part of Russian Northeast) AL Aleutia terrane (oceanic crust) (Probable Cretaceous and early Tertiary) (northern Pacific Ocean AM Amur River terrane (accretionary wedge or subduction zone - predominantly turbidites) (northern AN Anui terrane (metamorphosed continental margin) (eastern part of Russian Southeast)

KUR Kuril back-arc unit (Cenozoic) (southeastern Sea of Okhotsk)

ANV Aniva terrane (accretionary wedge and subduction zone - predominantly oceanic rocks) (Sakhalin Island, Russian Southeast s Bering Sea volcanic belt (late Tertiary and Quaternary) (Bering Sea, Seward Peninsula, and ASC Academy of Sciences collage (Sea of Okhotsk ATW Attu-Prince William terrane (accretionary wedge - predominantly turbidites) (northern Pacific Ocean) bu Bureya sedimentary basin (Jurassic and Early Cretaceous) (northwestern part of Russian AU Argun terrane (cratonal) (northwestern part of Russian Southeast) AV Alkatvaam terrane (accretionary wedge - predominantly turbidites) (northeastern Koryak Highlands, ca Cascade volcanic-plutonic belt (late Eocene to Quaternary) (central and southern Canadian AY Ayansk terrane (passive continental margin) (northern part of Russian Southeast)

CD Cadwallader terrane (island arc) (southern part of Canadian Cordillera)

DY Dorsey terrane (passive continental margin) (east-central part of Canadian Cordillera)

(southeastern Canadian Cordillera and northwestern U.S.A. Pacific Northwest)

EA Easton terrane (accretionary wedge and subduction zone - predominantly oceanic rocks)

EK Ekonay terrane (accretionary wedge and subduction zone - predominantly oceanic rocks) (eastern

BE Bennett terrane (passive continental margin) (East Siberian Sea) ch Charlie sedimentary basin (Cenozoic) (Beaufort Sea, Chukchi Sea, and adjacent area) BL Baladek terrane (cratonal) (northern part of Russian Southeast) ck Central Kamchatka volcanic and sedimentary basin (Oligocene to Holocene) (Kamchatka BR Bridge River terrane (accretionary wedge and subduction zone - predominantly oceanic rocks) BSC Bering Sea collage (northern Pacific Ocean and Bering Sea) cn Coast-North Cascade plutonic belt (Late Cretaceous to early Tertiary) (southeastern Alaska, BU Bureya superterrane (western part of Russian Southeast) CA Cassiar terrane (passive continental margin) (eastern part of Canadian Cordillera)

CG Chugach terrane (southern and southeastern Alaska)

CH Chukotka terrane (northern part of Russian Northeast)

(eastern part of Canadian Cordillera)

(southeastern part of U.S.A. Pacific Northwest)

ek East Kamchatka volcanic belt (Pliocene to Holocene) (eastern Kamchatka Peninsula) CK Chilliwack River terrane (island arc) (southern British Columbia, Canadian Cordillera and northern es East Sikhote-Alin volcanic-plutonic belt (Late Cretaceous and early Tertiary) (eastern part of U.S.A. Pacific Northwest) CKC Chukchi Cap terrane (passive continental margin) (age unknown) (Beaufort Sea, Chukchi Sea, and esa Eastern Sakhalin sedimentary basin (Cenozoic) (Sea of Okhotsk) gb Georgia Basin sedimentary assemblage (Late Cretaceous to Tertiary) (southern part of Canadian CO Coldfoot terrane (metamorphosed continental margin) (southern Brooks Range, Alaska) CZ Crazy Mountains terrane (passive continental margin) (east-central Alaska) gg Gravina-Nutzotin-Gambier volcanic-plutonic-sedimentary belt (Late Jurassic and Early Cretaceous) DL Dillinger terrane (passive continental margin) (west-central Alaska) (eastern-southern Alaska, southeastern Alaska, and Canadian Cordillera)

ih Ishikari-Tenpoku-Hidaka sedimentary-volcanic basin (Cretaceous and late Paleogene to Holocene) GD Goodnews terrane (accretionary wedge and subduction zone - predominantly oceanic rocks) io Indigirka-Oloy sedimentary-volcanic-plutonic assemblage (Middle Jurassic to Early Cretaceous) GL Galam terrane (accretionary wedge and subduction zone - dominantly oceanic rocks) (northern part (southeastern to northwestern Russian Northeast) ka Kamloops volcanic belt (early Tertiary) (central and southern Canadian Cordillera) GN Gonzha terrane (cratonal) (western part of Russian Southeast) kb Kuibiveem sedimentary assemblage (Cretaceous) (eastern Russian Northeast) GR Gar terrane (oceanic crust, seamount, or ophiolite) (northwestern part of Russian Southeast) kc Central Kamchatka volcanic belt (Eocene to Quaternary) (central Kamchatka Peninsula) GS Grindstone terrane (accretionary wedge - predominantly turbidites) (southeastern part of U.S.A.

> HI Hikada terrane (accretionary wedge and subduction zone - predominantly oceanic rocks) (Hokkaido HIA Hidaka-Aniva collage (Sea of Okhotsk HO Hoh terrane (accretionary wedge or subduction zone - predominantly turbidites) (southwestern Canadian Cordillera and Northwestern U.S.A. Pacific Northwest) IK Iruneiskiy terrane (island arc) (Kamchatka Peninsula)

IZ Izee terrane (turbidite basin) (southeastern part of U.S.A. Pacific Northwest)

GZ Ganal'skiy terrane (metamorphic) (southern part of Kamchatka Peninsula)

HE Henrietta terrane (passive continental margin) (East Siberian Sea)

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no North Okhotsk sedimentary basin (Sea of Okhotsk) ns Nelson plutonic suite (Jurassic) (southeastern Canadian Cordillera)

UNDIFFERENTIATED CENOZOIC AND MESOZOIC OVERLAP

SEDIMENTARY ASSEMBLAGES AND BASINAL DEPOSITS

NAME ABBREVIATIONS FOR OVERLAP SEDIMENTARY AND VOLCANIC

ASSEMBLAGES, BASINAL DEPOSITS, AND IGNEOUS ARCS

(Arranged alphabetically by map symbol)

al Aleutian volcanic arc - volcanic part (early Tertiary to Holocene) (Alaska Peninsula, Aleutian Islands,

am Alpha-Mendeleev Ridge (late Early Cretaceous to Paleogene) (Beaufort Sea, Chukchi Sea, and

as Amerasia sedimentary basin (Early Cretaceous to Quaternary) (Canadian Arctic Islands, Beaufort

at Alaska Range-Talkeetna Mountains volcanic-plutonic belt -volcanic part (Late Cretaceous and early

bg Blagoveshchensk sedimentary basin (Late Cretaceous to Quaternary) (East Siberian Sea and

bo Bowser sedimentary assemblage (Middle Jurassic to Early Cretaceous) (central and southern

atb Aleutian-Bowers sedimentary basin (Cenozoic) (northern Pacific Ocean and Bering Sea)

Czs Sedimentary rocks (Cenozoic)

Czv Volcanic rocks (Cenozoic)

Ks Sedimentary rocks (Cretaceous)

Tertiary) (southern Alaska)

Kvi Intermediate volcanic rocks (Cretaceous)

CzKs Sedimentary rocks (Cretaceous and Cenozoic

CzKsv Sedimentary and volcanic rocks (Cretaceous and Cenozoic

TKvm Mafic volcanic rocks (early Tertiary and Late Cretaceous)

an Aniva sedimentary basin (Cenozoic) (southern Sea of Okhots

bw Bowers Ridge volcanic belt (early Tertiary?) (Bering Sea)

cm Carmacks volcanic field (Late Cretaceous) (northern Canadian Cordillera)

co Colville sedimentary basin (Cretaceous and Cenozoic) (northern Alaska)

cok Central Okhotsk sedimentary basin (Cenozoic) (Sea of Okhotsk)

gz Graben zone (Cenozoic) (East Siberian Sea and adjacent areas)

hp Hope sedimentary basin (Late Cretaceous to Quaternary) (Chukchi Sea)

dr Deryugin sedimentary basin (Cenozoic) (Sea of Okhotsk)

Chishima Islands, Kuril Islands

western Canadian Cordillera, and northern U.S.A. Pacific Northwest)

and Canadian Cordillera)

cb Columbia River Basalt Group (Miocene) (U.S.A. Pacific Northwest and southern and central

cf Cordilleran sedimentary foreland basin (Late Jurassic to early Tertiary) (U.S.A. Pacific Northwest

ejck East Japan-Chishima-Kuril volcanic-plutonic belt (Neogene to Holocene) (Hokkaido Island, Japan;

ia Interior Alaska volcanic belt (middle Tertiary) (west-central Alaska and Saint Lawrence Island,

kh Kahiltna sedimentary and volcanic assemblage (Late Jurassic and Cretaceous) (southern and

kk Kamchatka-Koryak volcanic belt (Late Cretaceous to Miocene) (Kamchatka Peninsula and eastern

km Kuskokwim Mountains sedimentary, volcanic, and plutonic belt (Late Cretaceous and early Tertiary)

kn Kandik River sedimentary overlap assemblage (Early Cretaceous and Late Jurassic) (east-central

ko Khingan-Okhotsk volcanic-plutonic belt (Cretaceous) (northern part of Russian Southeast)

kw Kuskokwim Group (Cretaceous) (southwestern Alaska)

lb Lebed sedimentary basin (Cenozoic) (eastern Sea of Okhotsk

mak Makarov sedimentary basin (Cenozoic) (Sea of Okhotsk)

Sea, Chukchi Sea, East Siberia Sea and adjacent area)

TJs Sedimentary rocks (early Tertiary to Late Jurassic)

KHA Khanka superterrane (predominantly continental margin arc) (southern part of Russia Southeast) KI Kilbuck-Idono terrane (cratonal) (west-central Alaska) KK Kamuikotan terrane (accretionary wedge and subduction zone - predominantly oceanic rocks) (Hokkaido Island, Japan)

KL Kholondzhikansk terrane (turbidite basin) (northwestern part of Russian Southeast) rocks) (central part of Russian Southeast)

KE Kema terrane (island arc) (eastern part of Russian Southeast)

KLM Kiselevka-Manoma terrane (accretionary wedge and subduction zone - predominantly oceanic KM Kony-Murgal terrane (southeastern part of Russian Northeast) KO Kootenay terrane (metamorphosed continental margin) (southeastern part of Canadian Cordillera)

Kolyma-Omolon superterrane (central part of Russian Northeast) KOAC Aluchin terrane (subduction zone - predominantly oceanic rocks) (central part of Russian

KOAG Argatas terrane (accretionary wedge - predominantly oceanic rocks) (central part of Russian KOAL Alazeya terrane (island arc) (north-central part of Russian Northeast) KOB Beryozovka terrane (turbidite basin) (north-central part of Russian Northeast)

KOKN Kular-Nera terrane (accretionary wedge - predominantly turbidites) (central part of Russian KOKT Khetachan terrane (island arc) (north-central part of Russian Northeast)

KOL Oloy terrane (island arc) (north- to east-central part of Russian Northeast) KOM Munilkan terrane (ophiolite) (northwestern part of Russian Northeast) KOO Omolon terrane (cratonal) (southeastern part of Russian Northeast) KOP Prikolyma terrane (passive continental margin) (central part of Russian Northeast)

KOR Rassokha terrane (oceanic crust) (central part of Russian Northeast) KOV Omulevka terrane (passive continental margin) (south-central part of Russian Northeast) KOY Yarakvaam terrane (island arc) (northeastern part of Russian Northeast) KR Khor terrane (continental-margin arc) (eastern part of Russian Southeast) KRO Kronotskiy terrane (island arc) (southeastern Kamchatka Peninsula)

KS Kamchatskiy Mys terrane (oceanic crust) (eastern Kamchatka Peninsula) KT Kotel nyi terrane (passive continental margin) (New Siberian Islands) KUK Kuril-Kamchatka terrane (accretionary wedge - predominantly turbidites) (east of Kamchatka KV Kamvshovv terrane (island arc) (Sakhalin Island

KY Kovukuk terrane (island arc) (west-central Alaska) LD Laoelin-Grodekovsk terrane (island arc) (southwestern part of Russian Southeast) LG Livengood terrane (oceanic crust, seamount, or ophiolite) (east-central Alaska) LN Lan terrane (turbidite basin) (northern part of Russian Southeast) MA Manley terrane (turbidite basin) (east-central Alaska)

MAI Mainitskiy terrane (island arc) (northeastern part of Russian Northeast)

MK McKinley terrane (oceanic crust, seamount, or ophiolite) (central Alaska Range, Alaska) MKR Malokurilsk collage (Sea of Okhotsk) ML Maclaren terrane (continental-margin arc) (eastern Alaska Range, Alaska) MM Mamyn terrane (continental-margin arc) (northwestern part of Russian Southeast) MO Monashee terrane(cratonal) (southeastern part of Canadian Cordillera)

MY Mystic terrane (passive continental margin) (central Alaska) NA Nason terrane (accretionary wedge or subduction zone - predominantly turbidites) (north-central NAB Nabilsky terrane (accretionary wedge and subduction zone - predominantly oceanic rocks) NE Nemuro terrane (island arc) (Hokkaido Island, Japan, and Lesser Kuril Islands, Russian Southeast)

MT Methow terrane (turbidite basin) (southern Canadian Cordillera and northern U.S.A. Pacific

NS Nora-Sukhotin terrane (island arc) (western part of Russian Southeast) NU Nutesyn terrane (island arc) (northern part of Russian Northeast) NX Nixon Fork terrane (passive continental margin) (central and west-central Alaska) OC Olympic Core terrane (accretionary wedge or subduction zone - predominantly turbidites) (southern Canadian Cordillera and northern U.S.A. Pacific Northwest)

OF Olds Ferry terrane (island arc) (southeastern part of U.S.A. Pacific Northwest)

OH Okhotsk terrane (cratonal) (southeastern part of Russian Northeast) OIR Omchogsk-Iruneisk collage (Sea of Okhotsk) OK Olyutorka-Kamchatka terrane (island arc) (Koryak Highlands and Kamchatka Peninsula) OKM Okhotomorsk collage (Sea of Okhotsk) OL Oldoi terrane (passive continental margin) (northwestern part of Russian Southeast) OS Oshima terrane (accretionary wedge and subduction zone - predominantly oceanic rocks)

SM Slide Mountain terrane (accretionary wedge and subduction zone - predominantly oceanic rocks)

SY Sorachi-Yezo terrane (correlated with West Sakhalin terrane) (turbidite basin) (Hokkaido Island,

TO Tokoro terrane (accretionary wedge and subduction zone - predominantly oceanic rocks) (Hokkaido

PGR Pogranichny collage (Sea of Okhotsk) PK Pekul'ney terrane (accretionary wedge and subduction zone - predominantly oceanic rocks) (northeastern part of Russian Northeast) PR Pacific Rim terrane (accretionary wedge or subduction zone - predominantly turbidites) (southwestern Canadian Cordillera and northwestern U.S.A. Pacific Northwest)

RB Ruby terrane (metamorphosed continental margin) (northern west-central Alaska) SA South Anyui terrane (northern part of Russian Northeast) SB Stolbovskov terrane (island arc) (northern Kamchatka Peninsula SD Seward terrane (metamorphosed continental margin) (Seward Peninsula, Alaska and Chukotsk Eurasia Plate (East Siberian Sea) Peninsula, Northeastern Russian Northeast NAN Nansen Basin (Cenozoic) (Laptev Sea SHL Shelikovsk collage (Sea of Okhotsk) SHT Shmidt terrane (island arc) (Sakhalin Island)

> SMA Samarka terrane (accretionary wedge and subduction zone - predominantly oceanic rocks) (eastern part of Russian Southeast) SR Sredinnyi-Kamchatka terrane (metamorphic) (southern Kamchatka Peninsula) ST Stikinia terrane (island arc) (southeastern Alaska and west-central Canadian Cordillera) ST(?)Stikinia(?) terrane (island arc) (east-central Alaska) SV Seventymile terrane (accretionary wedge and subduction zone - predominantly oceanic rocks) SW Swakane terrane (cratonal) (northern part of U.S.A. Pacific Northwest)

(east-central part of Canadian Cordillera)

SZ Siletzia terrane (accretionary wedge and subduction zone - predominantly oceanic rocks) (western part of U.S.A. Pacific Northwest) TD Tukuringra-Dzhagdi terrane (accretionary wedge and subduction zone - predominantly oceanic rocks) (northern part of Russian Southeast TG Togiak terrane (island arc) (southwestern Alaska) TL Talovsiy terrane (accretionary wedge - oceanic rocks and turbidites) (Koryak Highlands, eastern

TR Terpeniya terrane (island arc) (Sakhalin Island, Russian Southeast)

TNB Tokoro-Nabilsky collage (Sea of Okhotsk)

TU Taukha terrane (accretionary wedge and subduction zone - predominantly oceanic rocks) UB Uniya-Bom terrane (turbidite basin) (northern part of Russian Southeast) UL Ulban terrane (accretionary wedge or subduction zone - predominantly turbidites) (northeastern part VE Vel'may terrane (subduction zone - predominantly oceanic rocks) (northeastern part of Russian

VL Viliga terrane (passive continental margin) (east-central part of Russian Northeast)

WA Wallowa terrane (island arc) (southeastern part of U.S.A. Pacific Northwest)

YO York terrane (passive continental margin) (western Seward Peninsula)

ZT Zhuravlesk-Tumnin (turbidite basin) (eastern part of Russian Southeast)

Alaska, and western Canadian Cordillera)

WP West Pekulney terrane (island arc) (northeastern part of Russian Northeast)

WR Wrangellia superterrane (island arc) (southern Alaska, southeastern Alaska, and western Canadian WS Wickersham terrane (passive continental margin) (east-central Alaska) WSA West Sakhalin terrane (correlated with Sorachi-Yezo terrane) (turbidite basin) (Sakhalin Island) WY Windy terrane (metamorphic) (central and eastern Alaska Range, Alaska) YA Yakutat terrane (accretionary wedge or subduction zone - predominantly turbidites) (southern

YN Yanranay terrane (accretionary wedge - predominantly turbidites) (eastern part of Russian

YT Yukon-Tanana terrane (metamorphosed continental margin) (east-central Alaska, southeastern

ZL Zolotogorskiy terrane (metamorphosed continental margin) (northeastern part of Russian Northeast)

VT Vetlovskiy terrane (accretionary wedge - predominantly oceanic rocks) (eastern Kamchatka

WK West Kamchatka terrane (accretionary wedge - dominantly turbidites) (western Kamchatka

Peninsula) (Koryak Highlands, Russian Northeast and Kamchatka Peninsula)

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